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Summary of Cleanup at the Idaho National Laboratory Site

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Idaho Completion Project

Bechtel BWXT Idaho, LLC

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Idaho Falls, Idaho 83415

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Assistant Secretary for Environmental Management
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EXECUTIVE SUMMARY

Over the past 50 years, the Idaho National Laboratory (INL) has played a key role supporting defense and nuclear energy programs for the U.S. Past practices at the INL and other U.S. Department of Energy (DOE) facilities have resulted in a legacy of waste generation and contaminants released to the environment. The DOE Environmental Management (EM) Program has been tasked with the complex challenge of cleaning up environmental releases, disposing of legacy waste, and closing no longer needed facilities in a timely and cost-effective manner.

The purpose of this document is to summarize the status of environmental cleanup activities at the end of October 2004 and to depict the expected conditions at completion of the EM cleanup mission in 2035. This information was gathered during preparation of the draft risk-based end state vision document in Fiscal Year 2004. DOE has decided to delay finalization of the risk-based end state vision document until after the new Idaho Completion Project contract is in place and a new life-cycle baseline for cleanup activities has been established. As a result, a decision was made to publish the information gathered so that it would be accessible to Idaho Completion Project employees who might benefit from it. The information was gathered from numerous Comprehensive Environmental Response, Compensation, and Liability Act documents and other published reports.

The 569,600-acre INL Site is classified as industrial and mixed use by the U.S. Department of the Interior Bureau of Land Management (DOE-ID 2002a, p. 30). Most of the work at the INL is performed within the Site's discrete primary facility areas. Approximately 98% of the Site is undeveloped and undisturbed. No significant change to the present INL boundaries or ownership is anticipated by 2035, and most of the developed areas of the Site will remain industrial use through the end of the EM cleanup mission. Likewise, the undeveloped areas will continue to be used as a buffer area around the Site’s developed facility areas and will be available for use for ecological and cultural preservation, environmental research, and controlled grazing and hunting.

Access to the entire Site will continue to be controlled for security purposes as long as there is an active DOE mission. The INL Site is expected to have a long-term future mission in nuclear energy research and development after EM cleanup is completed (currently anticipated for 2035). INL will be a multiprogram national laboratory, supporting the current and future needs of DOE Idaho Operations Office, DOE Office of Naval Reactors, and other DOE offices, together with other federal agencies such as the Department of Defense and Department of Homeland Security.

Controlled access to INL land provides environmental benefits by protecting important ecological and cultural resources. If the DOE mission is discontinued in the future, responsibility for managing land with no restrictions would revert to the U.S. Department of the Interior Bureau of Land Management, with the exception of the parcels of land that are owned by DOE. The DOE-owned parcels would transfer to the General Services Administration for disposition through the Federal Property and Administrative Services Act. However, land that still requires institutional controls cannot be declared excess (for disposition by the General Services Administration) or returned to the public domain. The DOE or its successor agency would be responsible for maintaining institutional controls in those areas where residual risk does not allow for unrestricted land use.

Of the 2% of the Site that has been disturbed, the great majority of the land will be cleaned up to levels acceptable for unrestricted use. It is anticipated that over 568,500 acres, or approximately 99.9% of the Site, will be available for unrestricted use. It is currently estimated that only 626 acres, or 0.1% of the Site, will require restricted access or use restrictions beyond 100 years because of residual contamination or buried waste. Of these 626 acres, it is expected that approximately 69 acres will be available for

unrestricted surface use but will require deed restrictions to prevent intrusion or residential use, while long-term access restrictions will be required for about 557 acres.

Most of the previous Comprehensive Environmental Response, Compensation, and Liability Act risk-based cleanup decisions for the INL have been based on a scenario of 100 years of federal institutional control followed by possible residential use. Although unrestricted use of much of the Site acreage will be possible after the active DOE mission has been terminated, it is unlikely that there will be a demand for residential use of the site for well in excess of 100 years. This belief is supported by the abundance of open land in the vicinity of the Site and the harsh climate at the Site. It is suggested that a more beneficial future use for the INL Site, after completion of the DOE mission, would be for conservation uses, such as a national monument or wildlife preserve, to offer continued protection for the extensive cultural, historic, and ecological resources on the Site.

The name of the Site was changed from Idaho National Engineering and Environmental Laboratory (or INEEL) to INL in February 2005. Therefore, the term INL is used when referring to the 890-square-mile Site. Some of the individual INL facilities also were renamed in February 2005; however, since this report represents conditions at the end of Fiscal Year 2004, the facility names that were in use at that time are used in this document. This is done to maintain consistency with the terminology in the referenced documents.

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ACRONYMS

ANL-W	Argonne National Laboratory-West
ARA	Auxiliary Reactor Area
ATR	Advanced Test Reactor
BLM	U.S. Department of the Interior Bureau of Land Management
BORAX	Boiling-Water Reactor Experiment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFLUP	Comprehensive Facility and Land Use Plan
COC	contaminant of concern
COPC	contaminant of potential concern
CPP	Chemical Processing Plant
DCE	1,2-dichloroethene
DCG	derived concentration guide
DD&D	deactivation, decontamination, and decommissioning
DEQ	Idaho Department of Environmental Quality
DOE	U.S. Department of Energy
EIS	Environmental Impact Statement
EM	Environmental Management
EPA	U.S. Environmental Protection Agency
ETR	Engineering Test Reactor
FFA/CO	Federal Facility Agreement and Consent Order
HI	hazard index
HLW	high-level waste
HLW EIS	High-Level Waste Environmental Impact Statement
HQ	hazard quotient

HWMA	Hazardous Waste Management Act
IC	institutional control
ICDF	INL CERCLA Disposal Facility
IET	Initial Engine Test
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LLW	low-level waste
LPSO	lead program secretarial office
MCL	maximum contaminant level
mg/L	milligrams per liter
MNA	monitored natural attenuation
MTR	Materials Test Reactor
nCi/g	nanocuries per gram
NE	Nuclear Energy, Science, and Technology Office of DOE
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Association
NRF	Naval Reactors Facility
OU	operable unit
PBF	Power Burst Facility
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
pCi/g	picocuries per gram
pCi/L	picocuries per liter
PEW	process equipment waste
ppb	parts per billion
ppm	parts per million

RCRA	Resource Conservation and Recovery Act
RDX	royal demolition explosive
RI/FS	remedial investigation/feasibility study
ROD	record of decision
RWMC	Radioactive Waste Management Complex
SDA	Subsurface Disposal Area
SPERT	Special Power Excursion Reactor Test
SVOC	semivolatile organic compound
TAN	Test Area North
TBD	to be determined
TCE	trichloroethene
TNT	trinitrotoluene
TRA	Test Reactor Area
TSA	Transuranic Storage Area
TSF	Technical Support Facility
USGS	United States Geological Survey
VCO	Voluntary Consent Order
VOC	volatile organic compound
WAG	waste area group
WCF	Waste Calcining Facility
WROC	Waste Reduction Operations Complex
WRRTF	Water Reactor Research Test Facility
µg/L	micrograms per liter

DEFINITIONS

agencies	The U.S. Department of Energy, the U.S. Environmental Protection Agency, and the State of Idaho—the three agencies responsible for the scope and schedule of remedial investigations and cleanup activities at the Idaho National Laboratory (INL).
ancillary equipment	Any device including, but not limited to, piping, fittings, flanges, valves, and pumps used to distribute, meter, or control the flow from its point of generation to: (1) an underground storage tank, an aboveground storage tank, or treatment tank(s), (2) between hazardous waste storage and treatment tanks to a point of disposal onsite, or (3) a point of shipment for disposal offsite.
aquifer	Layer of water-saturated rock or soil through which water flows in a quantity useful to people. The rate of flow depends upon porosity, permeability, and slope of the water table.
area of contamination	A continuous extent of generally dispersed contamination at a superfund site.
CERCLA	(Comprehensive Environmental Response, Compensation, and Liability Act). Federal law that establishes a program to identify, evaluate, and remediate sites where hazardous substances may have been released (leaked, spilled, or dumped) to the environment.
contaminant plume	An area of groundwater contamination, which is three-dimensional and usually elongated along the aquifer gradient. In this report, the contaminant plumes are those areas within the aquifer that exceed Idaho groundwater quality standards.
cultural resources	Include but are not limited to (1) prehistoric, historic, and ethnohistoric archaeological materials (artifacts) and sites on the ground surface or buried beneath it, (2) standing structures and associated components more than 50 years old or of importance because they represent a major historical theme or era, (3) cultural and natural places, select natural resources, and sacred objects important to Native Americans and other ethnic groups, and (4) American folk life traditions and arts.
deactivation	The process of placing a facility in a stable condition, including the removal of hazardous and radioactive materials to ensure adequate protection of worker, public health and safety, and the environment, thereby limiting the long-term cost of surveillance and maintenance.
decommissioning	A phase where the facility is taken to its ultimate end state through decontamination or dismantlement to demolition or entombment.
decontamination	The process of removing contamination at U.S. Department of Energy facilities. “Contamination” refers to both radioactive contamination and to hazardous substance contamination.

derived concentration guide	The concentration of a radionuclide in air or water that, under conditions of continuous exposure for 1 year by a single pathway (e.g., air inhalation, immersion, or water ingestion), would result in an effective dose equivalent of 100 mrem. The U.S. Department of Energy, through "Radiation Protection of the Public and the Environment" (DOE O 5400.5), has established these values.
end state	Physical condition when cleanup actions are complete.
FFA/CO	(Federal Facility Agreement and Consent Order). Agreement among the U.S. Department of Energy, U.S. Environmental Protection Agency, and State of Idaho that establishes a process and schedule to evaluate potentially contaminated sites at the INL, to determine if remediation is warranted, and then to select and implement a remedy.
groundwater	Water below the land surface in a zone of saturation.
hazard index	A ratio between the contaminant intake concentrations and the concentrations that are not likely to cause adverse health effects, even to sensitive populations such as pregnant women or children.
hazard quotient	The ratio of an exposure level by a contaminant (e.g., maximum concentration) to levels of contaminants in particular substances (e.g., soil, sediment, and water) that are known to cause harmful effects in plants or animals. If the exposure level is higher than the toxicity value, then there is the potential for risk to the receptor.
hazardous waste	A solid waste identified as hazardous in federal regulations (Resource Conservation and Recovery Act).
heel	A small quantity of residual material within a tank that cannot be removed by standard equipment such as pumps or air jets.
high-level waste	The highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and other highly radioactive material that the Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation.
historic building or structure	A building or structure, including Goodale's Cutoff, WWII canals, reactors, reactor control panels, WWII concussion walls, and shielded locomotive, that is eligible to the National Register of Historic Places.
INL	The 890-square-mile INL Site, including U.S. Department of Energy operations at the Site and supporting operations in Idaho Falls.

injection well	A well into which fluids are injected.
institutional controls	Generally includes all nonengineered restrictions on activities or on access or exposure to land, groundwater, surface water, waste and waste disposal areas, and other areas or media. Some common examples of tools to implement institutional controls include restrictions on use or access, zoning, governmental permitting, public advisories, and installation master plans. Institutional control commitments are necessary at sites where contamination levels prevent unrestricted and unlimited use.
lek	A sage grouse strutting ground or a location where sage grouse congregate to mate.
limited action	No remediation except for institutional controls and environmental monitoring.
long-term stewardship	All activities necessary to protect human health and the environment after remediation, disposal, or stabilization of a site or part of a site. The INL expanded the scope of long-term stewardship to include conservation of ecological and cultural resources and awareness of technology changes in addition to surveillance and maintenance of remedies.
low-level waste	Waste that contains radioactivity and is not classified as high-level waste, transuranic waste, spent nuclear fuel, or Atomic Energy Act Section 11 (e)(2) by-product material (e.g., uranium or thorium mill tailings) by U.S. Department of Energy Order 435.1 (2001). Test specimens of fissionable material irradiated for research and development only and not for the production of power or plutonium may be classified as low-level waste, provided the concentration of transuranic isotopes are less than or equal to 100 nCi/g.
mg/L	milligrams per liter. A milligram is one-thousandth of a gram (10^{-3}).
mixed low-level waste	Low-level waste that also contains hazardous waste subject to the Resource Conservation and Recovery Act.
mixed waste	Waste containing both radioactive and hazardous waste.
National Priorities List	A list, maintained by the U.S. Environmental Protection Agency, of uncontrolled hazardous waste sites that have releases of, or could release, hazardous substances to the environment and are subject to the Comprehensive Environmental Response, Compensation, and Liability Act.
nCi/g	nanocuries per gram. A nanocurie is one-billionth of a curie (10^{-9}).
off-Site	Off the INL Site.
pCi/g	picocuries per gram. A picocurie is one-trillionth of a curie (10^{-12}).

pCi/L	picocuries per liter. A picocurie is one-trillionth of a curie (10^{-12}).
perched water	Water that collects above a layer of relatively impermeable material, such as clay, and then slowly moves downward to the aquifer; perched water zones are often present beneath reservoirs and industrial facilities but disappear when the surface water source is eliminated.
person-rem	A measure of radiation dose to a population. If 1,000 individuals each receive 26 rem, then the collective dose or dose to the population is 1,000 persons × 26 rem or 26,000 person-rem.
radioactive waste	Solid, liquid, or gaseous material that contains radionuclides regulated under the Atomic Energy Act of 1954, as amended, and that is of negligible economic value considering recovery costs.
radionuclide	Alternate forms or isotopes of an element that are unstable and decay by giving off energy in the form of radioactivity.
RCRA	(Resource Conservation and Recovery Act). Federal waste management law. Its regulations govern the management (transportation, treatment, storage, and disposal) of solid waste and the generation, accumulation, recycling, and handling of hazardous waste. RCRA waste includes material listed on one of the U.S. Environmental Protection Agency's hazardous waste lists or material that meets one or more of the U.S. Environmental Protection Agency's four characteristics: ignitability, corrosivity, reactivity, or toxicity.
record of decision	An agreement among the agencies that explains which remedies will be used at a site and why. The responsiveness summary contains public comments on proposed actions and the agencies' responses.
remedial action objectives	Objectives for the cleanup remedy that specify contaminants and media of concern, potential exposure pathways, and remediation goals.
remediation	Process of cleaning up, to an acceptable level of risk, a site where a hazardous or radioactive substance has been released.
residual contamination	Amount of a hazardous or radioactive pollutant remaining in the environment after a natural or technological remediation process.
RI/FS	(remedial investigation/feasibility study). Identifies contaminants in an area, assesses the risk they pose to human health and the environment, and evaluates remedial options.
risk assessment	The process of estimating the current and future adverse health impacts to humans and the environment.

secondary containment system	An impervious system that will contain all of the contents of a tank and has residual space adequate to contain any other material that could be expected to accumulate before the secondary containment is emptied.
spent nuclear fuel	Fuel that has been withdrawn from a nuclear reactor following irradiation.
tank farm	The tank farm is a collection of 15 belowground stainless steel tanks enclosed in belowground concrete vaults. The tank farm includes 11 belowground 300,000-gal and 318,000-gal tanks, which were used to store liquid high-level waste generated by spent nuclear fuel reprocessing operations and sodium-bearing waste from incidental activities, such as decontamination, associated with Idaho Nuclear Technology and Engineering Center operations.
transuranic waste	Radioactive waste containing more than 100 nCi/g of alpha-emitting transuranic isotopes, with half-lives greater than 20 years.
unexploded ordnance	Military munitions that have been primed, armed, or fuzed and fired; dropped; or launched but through malfunction or design have failed to explode. Unexploded ordnance poses a physical risk to human safety through the danger of explosion when it is handled or contacted, especially by machinery.
vadose zone	Unsaturated layers of rock and soil extending from the ground surface down to the water table, or aquifer. Contaminants move at different rates through the vadose zone depending on how they react with the rock and sedimentary material.
vapor vacuum extraction	Technology that extracts vapor from the vadose zone by inducing a vacuum in wells located at specific depths. The vacuum forces underground vapors to flow toward the well and up into an aboveground treatment system.
wetland	A wetland is any geographic area that exhibits three characteristics indicating that the area is wet, at least periodically. Wetlands do not necessarily appear to have freestanding water. The wetland determination is based on soil moisture content, type of plant life, and type of soil.
µg/L	micrograms per liter. A microgram is one-millionth of a gram (10^{-6}).

Summary of Cleanup at the Idaho National Laboratory Site

1. INTRODUCTION

When all active Environmental Management (EM) cleanup activities have been completed, which is expected to take place by 2035 or sooner, responsibility for operation and long-term stewardship of the Site will be transferred to the U.S. Department of Energy's (DOE's) lead program secretarial office (LPSO) for the Idaho National Laboratory (INL) or to other appropriate DOE programs. The current LPSO for the INL Site is the Nuclear Energy, Science, and Technology Office of DOE (NE).

There are exceptions to the 2035 timeframe for the end state descriptions in this report. At some facility areas, groundwater monitoring and groundwater remediation are expected to continue beyond 2035. The goal for DOE's selected Snake River Plain Aquifer remedial actions is to be below maximum contaminant levels (MCLs) in the aquifer by 2095. Therefore, 2095 is considered the end state timeframe for discussions related to groundwater remediation. The DOE LPSO or other appropriate DOE programs will assume responsibility for groundwater monitoring and groundwater remediation as well as for future cleanup activities upon completion of the EM mission. In addition, there are some areas where institutional controls will be required beyond 2035. The DOE LPSO will assume responsibility for this scope as well.

Several compliance agreements, amendments, and consent orders executed between 1991 and 2000 govern the EM cleanup work at the INL. The primary agreements are summarized below:

- Federal Facility Agreement and Consent Order (FFA/CO)—In November 1989, the U.S. Environmental Protection Agency (EPA) listed the INL on the National Priorities List of the "National Oil and Hazardous Substances Pollution Contingency Plan" (40 CFR 300). As a result, the INL became subject to the cleanup requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (DOE-ID 1991a) between the DOE, EPA, and Idaho Department of Environmental Quality (DEQ) established a strategy and plan for cleanup at the INL in accordance with CERCLA. The INL was divided into 10 waste area groups (WAGs) based on similar characteristics or geographic boundaries. Nine groups generally correspond to the Site's major facility areas. The tenth group assesses overall risk to the aquifer beneath the Site, addresses sites outside the boundaries of INL's primary facility areas, and allows for inclusion of newly identified release sites. The locations of the WAGs are shown on Figure 1-1. These WAGs are further divided into operable units (OUs). Under the FFA/CO, the DOE conducts an environmental investigation at each site that may be contaminated. The EPA and DEQ are active participants. At the end of each investigation, if the agencies determine that the area needs remediation, a proposed plan that documents the results of the investigation and identifies a preferred alternative is presented for public comment. After reviewing and addressing any comments, the DOE, EPA, and DEQ reach a final decision, which is documented in a record of decision (ROD). Remedial design and remedial action are then initiated.

- Notice of Noncompliance Consent Order—*The Notice of Noncompliance Consent Order* (DEQ 1992) is an agreement between the DOE, DEQ, and EPA that establishes actions and milestones to resolve 1989 EPA Resource Conservation and Recovery Act (RCRA) inspection issues, including configuration of stored transuranic waste and high-level waste (HLW) in the Idaho Nuclear Technology and Engineering Center (INTEC) tank farm.

- Settlement Agreement—The *Settlement Agreement* (DOE 1995) between the DOE, State of Idaho, and U.S. Navy resolved a lawsuit regarding the receipt of spent nuclear fuel at the INL. The agreement specifies milestones toward the removal of all spent nuclear fuel and certain radioactive waste from INL by 2035.

- Site Treatment Plan—In fulfillment of the 1992 Federal Facilities Compliance Act, the INL prepared *Idaho National Engineering Laboratory Site Treatment Plan* (DOE-ID 1995a) to address the long-term storage of waste that contains both chemical and radioactive materials. This enforceable plan was approved by the State of Idaho and is updated annually.

- Voluntary Consent Order (VCO)—The *Consent Order* (DEQ 2000) is an enforceable agreement with DEQ that governs resolution of self-disclosed RCRA issues, most of which were related to the closure of numerous tanks and tank systems.

All closure options are evaluated through processes established under CERCLA or the National Environmental Policy Act (NEPA). RCRA treatment, storage, or disposal facilities require formal RCRA closure plans in addition to the documentation required by the NEPA or CERCLA processes. The State of Idaho DEQ is authorized to administer the RCRA program.

NEPA requires federal agencies to consider and analyze potential environmental impacts of proposed actions and explore appropriate alternatives to mitigate those impacts, including a No Action alternative. Agencies are required to inform the public of the proposed actions, impacts, and alternatives and consider public feedback in selecting an alternative. DOE implements NEPA according to procedures in "National Environmental Policy Act Implementing Procedures" (10 CFR 1021) and assigns authorities and responsibilities according to "National Environmental Policy Act Compliance Program" (DOE O 451.1B).

Closure actions under CERCLA can be conducted as remedial actions under the FFA/CO or as removal actions. These processes are described in Section 4.

The name of the Site was changed from Idaho National Engineering and Environmental Laboratory (or INEEL) to INL in February 2005. Therefore, the term INL is used when referring to the 890-square-mile Site. Some of the individual INL facilities also were renamed in February 2005; however, since this report represents conditions at the end of Fiscal Year 2004, the facility names that were in use at that time are used in this document. This is done to maintain consistency with the terminology in the referenced documents.

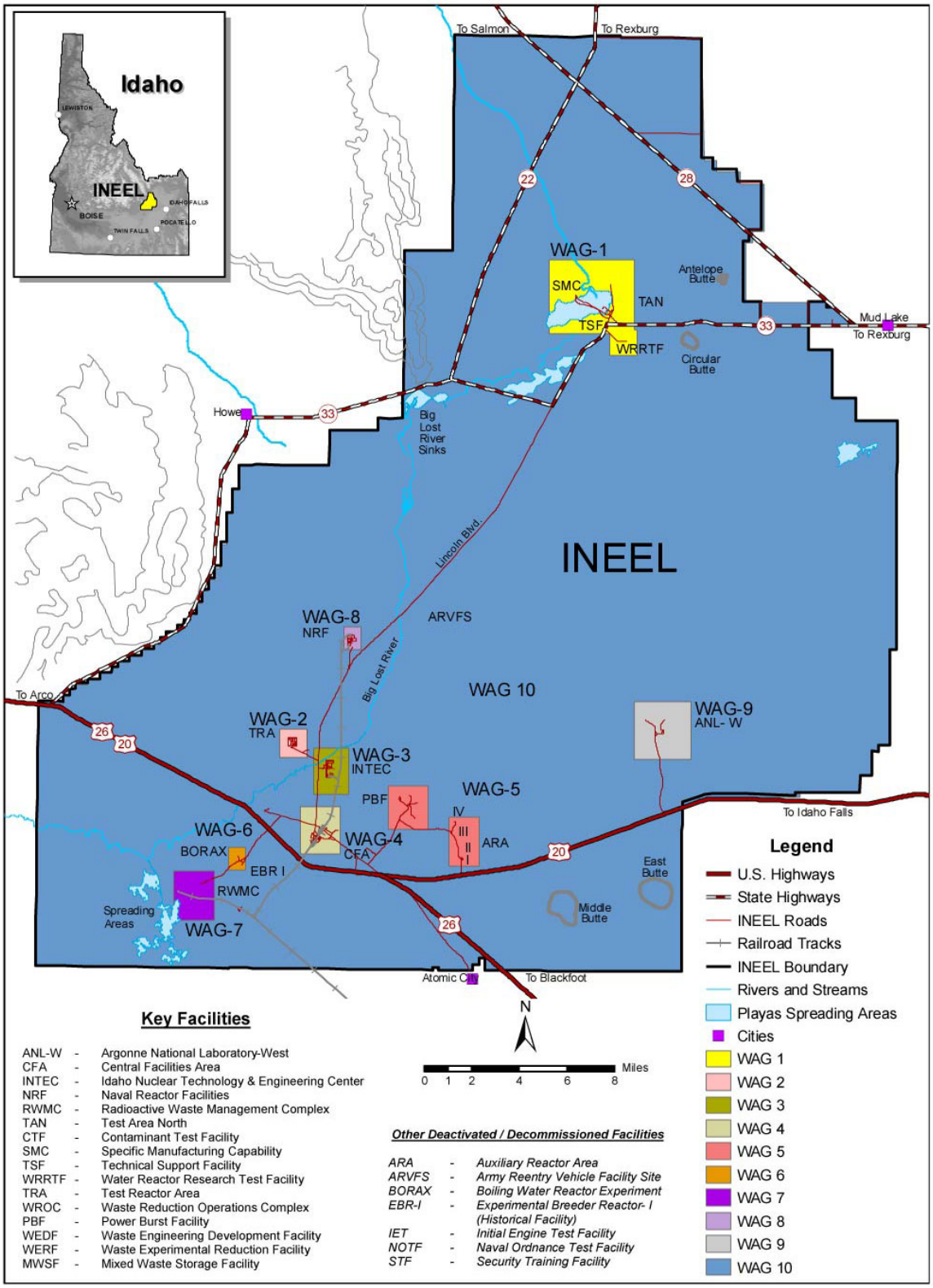

Figure 1-1. Locations of waste area groups at the Idaho National Laboratory.

1.1 Organization of the Report

Section 1 of this report provides general, introductory information related to this document; a summary of the INL's past, current, and future missions; and a brief discussion of the types of hazards and contamination at the Site. Section 1 also provides an overview of the Site cleanup strategy, priorities, and remaining cleanup work.

Section 2 provides information on the region surrounding the INL. Maps and narratives describe physical characteristics and human and ecological land use for the region surrounding the INL.

Section 3 provides information on physical characteristics, human and ecological land use, legal ownership, and population of the INL Site and areas next to the Site. Maps and narrative for Sections 2 and 3 depict both the current state and the end state.

Section 4 provides information on eight separate "hazard areas" at the Site. A hazard area is a portion of the Site that contains hazards that present risks to human health or the environment (e.g., contaminated soil, entombed facilities, contaminated groundwater plumes, or buried waste). In general, the hazard areas correspond to WAGs established in the FFA/CO; however, information on other planned closure activities, such as RCRA closures; VCO activities; and deactivation, decontamination, and decommissioning (DD&D), also is provided. Each of the eight hazard area subsections in this document contains a brief narrative description followed by a map and a conceptual site model depicting the current hazards. These are followed by a map and conceptual site model that reflect anticipated conditions at the end state. Differences between current state and end state are discussed in the narrative.

Conceptual site models provide, in block diagram form, information regarding the hazards, pathways, receptors, and barriers (current and planned) between the hazards and receptors. The conceptual site models, which were prepared during baseline risk assessments and published in approved CERCLA documents, have been updated to reflect current (2004) conditions and modified to show anticipated conditions at the end state. The conceptual site models represent contaminated sites that have been determined to pose a risk to human health and the environment. They do not include properly designed, structurally intact facilities with no identified releases to the environment that are currently used to manage radioactive or hazardous materials (e.g., calcine bin sets, storage tanks, and treatment facilities).

Section 5 contains a list of references used in this document. This document also includes an appendix, which provides information on institutional controls.

1.2 Site Mission

The INL Site began its mission during World War II when the U.S. Navy withdrew 270 square miles in Southeast Idaho from the public domain for use as a gunnery range.

Three extensive artillery testing and bombing ranges were used by the U.S. Navy and U.S. Army Air Corps during World War II. They are the Naval Proving Grounds (also known as the Naval Gun Range), which encompasses 172,495 acres along the INL's central corridor; the Arco High-Altitude Bombing Range, which is a 26,406-acre area to the west; and the Twin Buttes Bombing Range, which includes 9,291 acres along the southeast edge of the Site. The Naval Proving Ground was used to test-fire 3–16-in.-diameter naval ship guns reconditioned at the Naval Ordnance Plant in Pocatello, Idaho. Between 1942 and 1950, approximately 1,650 guns were tested at the Naval Proving Ground. The Twin Buttes Bombing Range was used by B-17 bombers flying practice missions out of the Army Air Corps base at Pocatello beginning in 1942 and continuing through World War II. The Arco High-Altitude

Bombing Range was used during World War II by the army for aerial bombing practice. As a result of these activities, over 200,000 acres were contaminated with unexploded ordnance and associated explosive contaminants remaining from munitions testing activities.

In 1950, the U.S. Atomic Energy Commission (the predecessor to the DOE) obtained the Navy's gunnery range and established the site as the National Reactor Testing Station.

Lands were added later for use in developing and testing nuclear reactors and support facilities. Over the years, personnel at the Site have designed and tested 52 reactors, the world's largest concentration. Most of them were first-of-a-kind reactors, and many made significant contributions to what were then the newly developing fields of reactor safety and design. For example, the Experimental Breeder Reactor I, which is now a National Historic Landmark, was the first reactor in the world to generate electricity. Three nuclear reactors are still operable today. The Advanced Test Reactor (ATR) at the INL's Test Reactor Area (TRA) is used for materials testing and the production of medical and industrial isotopes. The other two operable reactors are the ATR Criticality Facility at TRA, which is a full-scale, low-power version of the ATR designed to provide physics data, and the Neutron Radiography Reactor at Argonne National Laboratory-West (ANL-W).

The INL received its first shipments of DOE-owned spent nuclear fuel from nuclear weapons production reactors at the Hanford Site in Richland, Washington, in 1952. In 1957, the Navy began shipping spent nuclear fuel from nuclear-powered submarines and warships to the INL. Spent nuclear fuel was reprocessed to recover highly enriched uranium for reuse in the nation's weapons program from 1953 to 1992.

From 1954 through 1970, over 67,000 m^3 of transuranic waste, mostly from the Rocky Flats Plant in Colorado, were disposed of in the Subsurface Disposal Area (SDA) at the Radioactive Waste Management Complex (RWMC).

In 1974, the National Reactor Testing Station was renamed the Idaho National Engineering Laboratory to reflect an expanded mission, including waste management, environmental engineering and restoration, and development of advanced technologies and methods related to energy efficiency, renewable energy, national security and defense, and nuclear materials. In 1997, the Site was renamed the Idaho National Engineering and Environmental Laboratory to reflect its increased mission focus on environmental cleanup and research and development of related technologies.

In July 2002, Secretary of Energy Spencer Abraham announced a major mission realignment for the lab, establishing the Site as the nation's lead laboratory for nuclear energy research and development. Management of the laboratory was reassigned to NE.

Since 1991, the INL EM Program has been managing a significant cleanup legacy, including contaminated groundwater, contaminated buildings and soil, and significant volumes of radioactive and hazardous waste.

The INL EM Program is responsible for treating, storing, and disposing of waste streams; removing or deactivating facilities that are no longer needed; and cleaning up contamination from past releases that presents a risk to human health or the environment. The INL EM Program is scheduled to complete all active cleanup by 2035, at which time operation and maintenance of all INL facilities will be transferred to the LPSO for the Site.

1.3 Status of Cleanup Program

In May 2002, DOE, DEQ, and EPA signed a letter of intent formalizing an agreement to pursue accelerated risk reduction and cleanup at the INL. This letter of intent identified seven priorities for accelerating cleanup. The seven priorities are (DOE-ID 2002b):

- Continued cleanup and protection of the Snake River Plain Aquifer
- Consolidation of EM activities to INTEC, reducing the actively managed EM footprint by over 51%
- Removal and stabilization of sodium-bearing liquid waste from the INTEC tank farm and RCRA closure of the HLW tanks
- Placement of all DOE spent nuclear fuel managed by EM into dry storage
- Transfer of all special nuclear material managed by EM to other sites
- Completion of shipments of stored transuranic waste required by the *Settlement Agreement* (DOE 1995)
- Making significant progress in remediation of the buried waste in accordance with the comprehensive remedial investigation/feasibility study (RI/FS) and ROD for the SDA.

In July 2002, the *Performance Management Plan* (DOE-ID 2002b) was published. This document defines the INL EM Program vision as "By 2012, the INL will have achieved significant risk reduction and will have placed materials in safe storage ready for disposal. By 2020, the INL will have completed all active cleanup work with potential to further accelerate cleanup to 2016."

In mid-2003, the INL was restructured into two distinct business units—one for cleanup activities and one for laboratory missions. This was done to allow each organization to focus on its distinct mission. The laboratory will focus on nuclear technology development, and the INL EM Program will focus on cleaning up historic contamination at the Site as quickly and efficiently as possible.

Over the past decade, the following considerable progress has been made toward addressing legacy waste and contamination at the INL:

- Of the 643 CERCLA sites identified as being potentially contaminated, 71% have been cleaned up or determined not to pose any risk.
- Over 2 million gal of high-level liquid waste have been calcined, and 10 of the 15 tank farm tanks have been cleaned and sampled. By the end of January 2005, only three of the tank farm tanks will still contain waste.
- Stored transuranic waste is being sent for permanent disposal on a routine basis to the Waste Isolation Pilot Plant in New Mexico (more than 3,100 m^3 have been shipped).
- A 3-year accelerated project to eliminate the containerized mixed waste backlog was completed. Only 105 containers of untreated waste remain in storage at the INL awaiting resolution of the waste-incidental-to-reprocessing issue and opening of a permitted disposal facility at Hanford. Five

of the six INL mixed waste storage facilities have been emptied of all waste and have been closed or are undergoing closure.

- 92% of INL EM-owned spent nuclear fuel, by weight, has been consolidated into dry storage.
- More than 173,000 lb of volatile organic compounds (VOCs) have been extracted and destroyed from the vadose zone beneath the RWMC.
- Since 2001, 192,272 ft^2 of surplus facilities have been deactivated, decontaminated, and decommissioned. Seventy-eight percent of this work was completed in calendar year 2004 alone.

The following is a summary of the major cleanup activities still remaining at the INL Site:

- Treatment of remaining sodium-bearing-waste liquids in the INTEC tank farm and closure of 11 HLW tanks and ancillary equipment
- Retrieval, packaging, and preparation of 4,386 m^3 of calcine for shipment to an off-Site repository
- Shipment of all DOE-owned legacy spent nuclear fuel to an off-Site repository by January 1, 2035
- Deactivation, decontamination, and demolition of surplus inactive facilities
- Remediation of remaining contaminated sites at the RWMC, INTEC, and Test Area North (TAN).

The *Performance Management Plan* (DOE-ID 2002b) states that some activities will continue after 2020: shipment of spent nuclear fuel to a repository; retrieval, treatment, packaging, and shipment of HLW calcine to a repository; and final dismantlement of remaining EM buildings. These activities should be complete by 2035 with the exception of continued remediation of groundwater through monitored natural attenuation (MNA) and some activities leading to long-term stewardship. Responsibility for groundwater remediation and environmental monitoring will be transferred to the DOE LPSO upon completion of the EM cleanup mission.

More specific information on cleanup strategies, priorities, and milestones is available in the *Performance Management Plan* (DOE-ID 2002b).